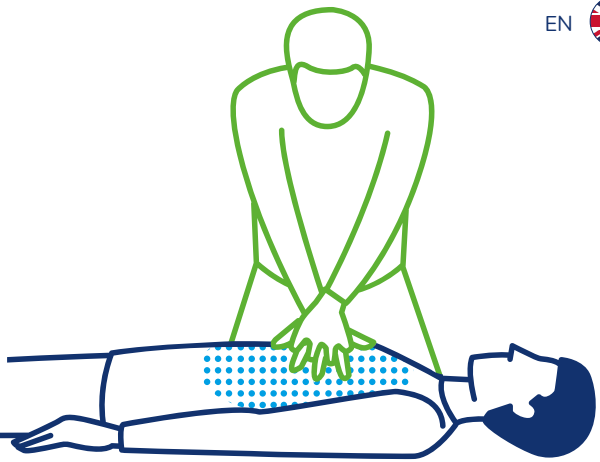
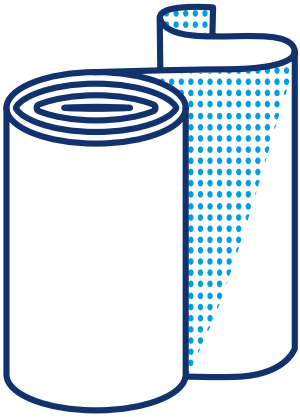
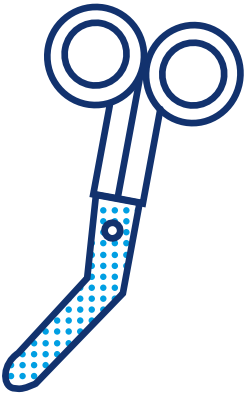
FIRST AID

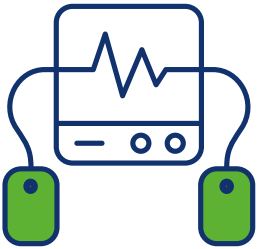
EN

112









CORPS GRAND-DUCAL
INCENDIE & SECOURS

INTRODUCTION

People are affected by accidents and all kinds of life-threatening illnesses every day. These can occur within the family, in friendship groups, in a sporting environment, at work or when taking part in a leisure activity. If a situation of this kind arises, it is important to seek help as quickly as possible and to implement first aid measures. The first people from the emergency services to be contacted in rural areas are generally first responders, followed by an ambulance with or without an emergency doctor. The emergency services will treat the affected person under the best possible conditions and transport them to hospital. Unfortunately, valuable minutes are often lost between the occurrence of the emergency situation and the arrival of professional assistance. In some cases, these few minutes can be the difference between life and death and can significantly influence the prospects of the affected person. This first aid course should help you to recognise emergency situations more quickly and make the best use of the time before the emergency services arrive.

FIRST AID - GENERAL INFORMATION

FIRST AID

1.1 RESCUE CHAIN

The rescue chain is the ideal process for treating people with life-threatening conditions or injuries using first aid measures. In case of an emergency, the first aider should secure the site, make an emergency call and take immediate action. You must make it a priority to protect yourself in all cases! As soon as the emergency services and emergency doctor arrive, they will take over and transport the affected person to an appropriate hospital.

The fastest emergency services and the best medical care in hospital are of no use if no first aid is provided in acute cases and if this part of the rescue chain is lacking. The first aider therefore has a major influence on the person‘s chance of survival and is the most important link in the rescue chain in life-threatening emergency situations, such as cardiopulmonary resuscitation.

Rescue chain:

1. Securing / selfprotection
2. Emergency call / immediate action
3. Additional first aid
4. Emergency services
5. Hospital

1.2 PROCEDURE AT THE SCENE OF THE ACCIDENT

Priority must always be given to protecting yourself. First aiders should always remain attentive so that they can recognise potential risks.

No one should place themselves in danger in order to offer first aid. This also applies to the emergency services staff. It is important for first aiders to recognise what has happened, to consider what the potential risks are and to proceed and act accordingly.

It is particularly important in the event of traffic accidents to follow the correct procedure at the scene of the accident. Traffic represents a considerable source of danger and it is therefore important to act in a structured manner and take safety precautions.

1. → 2. → 3. → 4.

1.

As has already been stated, priority must be given to protecting yourself. You should immediately switch on your vehicle's hazard warning lights. The first aider and all passengers should leave the car and put on high-vis jackets. Everyone should move to a place of safety, for example behind the crash barrier, after putting on their high-vis jackets.

2.

The scene of the accident should be properly secured without putting the people involved at risk. Warning triangles should be positioned at a sufficient distance from the scene of the accident so that other road users can be warned in good time.

Auto Club Europa recommends 150 – 300 m; the necessary distance from the scene of an accident or breakdown is calculated on the basis of the traffic speed and local conditions (before or after hills, dips and bends). .

3.

After the scene of the accident has been secured, the first aider should assess the overall situation. **Are there any injured people or is there only material damage? How many injured people are there?** It is important to remain calm in order to assess the situation and not overlook anything.

4.

Once you have a general idea of the overall situation, you should seek assistance by calling the emergency number 112. After the emergency call has been made, you can start to administer first aid.

1.3 EMERGENCY NUMBER 112

The emergency number 112 applies throughout Europe both on landlines and mobile networks. It is an important element in the first aid process. The more precise the information provided to the emergency call handlers, the faster professional assistance can be obtained.

It may be helpful to memorise these 5 'W' questions :

WHERE has the incident occurred?

WHO is calling?

WHAT has happened?

WHAT NUMBER of people need help? WHAT KIND of injuries / illnesses are involved?

⟶ Waiting for call-backs

1.4 OBLIGATION TO OFFER ASSISTANCE

According to Articles 410-1 and 410-2 of the penal code (Code pénal), every citizen is obliged to help a person in an emergency situation provided that the helper is not exposed to direct danger. Making an emergency call comes under the definition of assistance.

2.1 WOUNDS, BLEEDING AND BURNS

2.1.1 Wounds

A wound is an injury which is caused by cuts or surface damage to the skin or mucous membrane. Wounds are one of the injuries most frequently treated by a first aider.

Distinctions need to be made between the different types of wound caused as a result of a whole range of scenarios.

We are able to distinguish between:

- Abrasions
- Stab wounds
- Cuts
- Contused wounds
- Lacerations
- Deep cuts
- Bites
- Bullet wounds

The main risks in the event of wounds are **bleeding**, which can quickly lead to a critical condition in the affected person, and **wound infections**.

Wound infections are caused by pathogenic germs which enter the body through damaged layers of skin. These pathogens are present everywhere and even minor wounds can become infected. An infection generally arises as a result of impurities in the wound due to inadequate protection. An infection places a strain on the whole body and must therefore be identified and treated as quickly as possible.

Signs of infection include:

- Throbbing pain
- Redness
- Heat
- Swelling
- Suppuration
- Fever

Infected wounds should usually be examined by a doctor.

All wounds must be treated and cleaned properly to prevent complications caused by wound infections.

Wound care

Effective wound care fulfils three purposes:

1. The wound can no longer be contaminated by germs or pathogens.
2. Bleeding is stopped.
3. The wound area is tranquillised, which can alleviate pain.

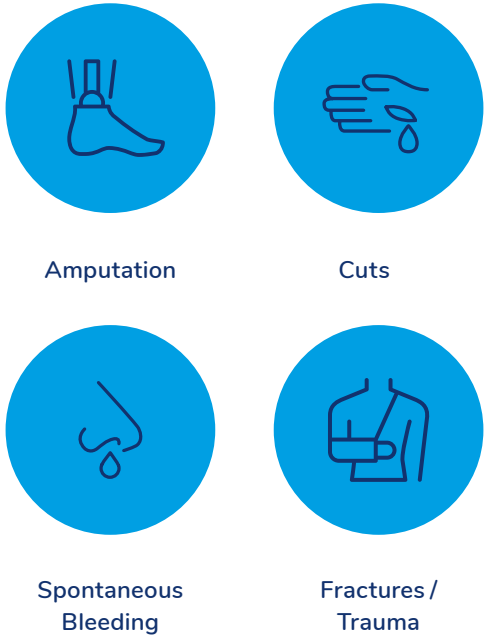
A sterile wound dressing generally consists of a wound pad which is as germ-free as possible (sterile) and a fastening system. The wound pad should completely cover the wound. Wound pads can be held in place by means of sticking plaster, bandages or Esmarch bandages.

! It is important to adhere to the following when caring for wounds:

- Do not touch the wound with bare hands.
- Wear disposable gloves if possible to protect yourself against infection!
- Do not remove foreign bodies from the wound as to do so could cause further injury and bleeding. Foreign bodies should be stabilised in a pre-clinical setting using sterile bandages. You will need a few wound pads, padding materials (for example, sterile bandages or clean handkerchiefs) and dressing materials for this purpose.

2.1.2 Bleeding

Causes of bleeding:



We are able to distinguish between:

Arterial bleeding: Bright red blood spurts intermittently (pulsating) from the wound.

Venous bleeding: Dark red blood flows from the wound without pressure.

Capillary bleeding: The blood trickles from the wound.

Steps to be taken in case of profuse bleeding

Stop the bleeding!

Apply direct pressure on the wound:
For the majority of wounds, this is sufficient to stop the bleeding with a sterile wound dressing.

Raise the bleeding limb:
Wherever possible, the limb should be raised, preferably above the level of the heart.

Apply a compression bandage:
If a normal bandage is not sufficient, a compression bandage should be applied immediately.

Videos on dressings

Ligate the limb:
If critical bleeding nevertheless continues, the limb must be ligated.

Ligating a limb blocks circulation and therefore stops the bleeding.
However, there is a risk that the limb could become numb. For this reason, the time of the ligation must be made clearly visible on the injured party's body.

If bleeding can still not be stopped, further ligation may be performed on top of the initial one.

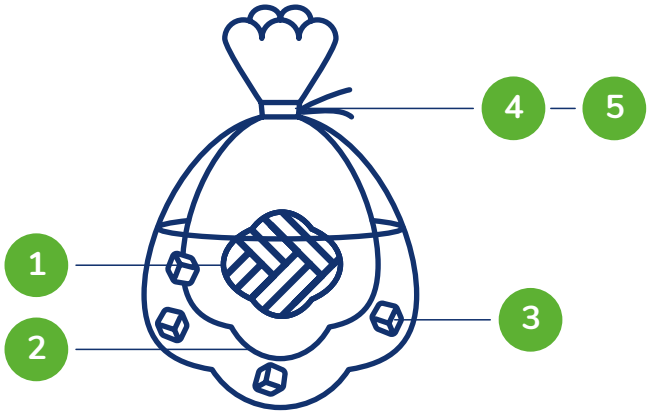
Video on profuse bleeding

First aiders must not undo ligation ties!

Amputation

In the event of amputation injuries, pressure must be applied immediately to the residual limb (stump). In the event of profuse bleeding, ligation should be performed as quickly as possible.

It is extremely important to store and handle the amputated body part carefully with the hope of potential replantation. The amputated body part should be dealt with after attention has been given to the affected person and their stump.



The amputated body part should be stored appropriately for transport:

1. Wrap the amputated body part in a sterile or clean cloth
2. Place the wrapped amputated body part in a plastic bag and seal tightly
3. Fill a second plastic bag with water and ice
4. Place the first bag inside the second
5. Close the openings of both bags together tightly and seal.

! Make sure that the injured person is not neglected due to the amputated body part.

All amputated body parts should be taken to the hospital with the injured person where possible.

Specific kinds of bleeding

Nosebleeds:

! | Causes: Nosebleeds occur when fine vessels are broken in the mucous membrane of the nose, which is well supplied with blood. Nosebleeds can occur spontaneously or can be triggered by external impacts.

| First aid:

- Make sure that the affected person is sitting upright with their head tilted forward so that the blood can run out.
- Pinch the nostrils together for a few minutes.
- Cool the back of the neck.
- Seek medical advice if bleeding continues.

Coughing blood:

! | Causes: Coughing blood can be caused by a chest injury, lung disease or ruptured lungs. Coughing blood is not to be confused with bleeding in the mouth. This can occur due to wounds inside of the mouth, for example after a visit to the dentist or biting the tongue.

| Signs for diagnosis:

- Bright red foamy sputum
- Difficulty breathing
- Chest pain

| First aid:

- Seek medical help, call the emergency number if necessary
- Offer comfort
- Move the person to a semi-reclined position to assist breathing

Stomach / intestinal bleeding:

! | Causes: Stomach / intestinal bleeding is caused by injury or disease. These can include stomach ulcers and haemorrhoids.

| Diagnosis:

- Vomiting blood (bright red to coffee coloured)
- Blood in stools (bright red to black)

! Risk: Hypovolaemic shock due to internal bleeding

| First aid:

- Always seek medical advice, call the emergency number if necessary
- Position the person so that the abdominal wall is relaxed
- Position the person as they request

Bleeding from the ears:

! | Causes: Bleeding from the ears is caused by disease or injury (e.g. middle ear infection or cranial injury).

| Diagnosis:

- Often difficult to diagnose as bleeding is generally very minimal

| First aid:

- Cover the ear with a sterile wound pad
- Allow the blood to flow out
- Raise the upper body

2.1.3 Burns

Particular attention must be paid to protecting yourself in the event of burns! Burns are caused by temperature effects which can damage various layers of the skin.

Temperature and exposure time influence the depth of the burn.

The severity of the burn is determined by the affected surface and the depth. However, other secondary injuries, the location of the burn and the age of the injured person are also extremely significant.

Causes of burns and scalds:

Chemicals	Fire	Radioactivity
Liquid / Steam	Sun	Hot objects
Friction	Electricity	

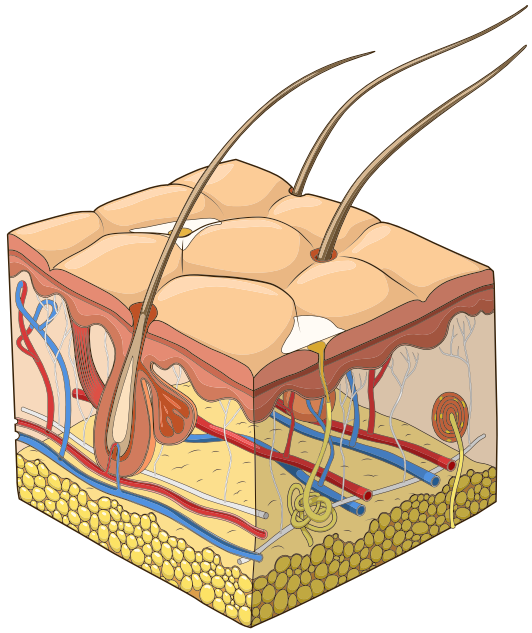
The layers of the skin

Our skin consists of three layers:

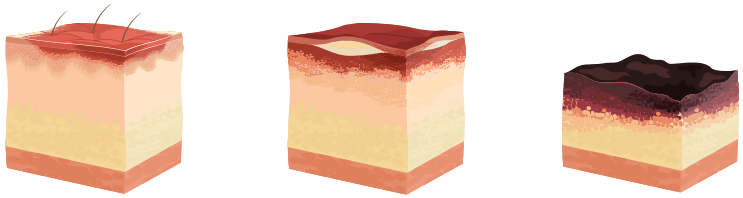
EPIDERMIS
upper layer
of the skin

DERMIS
true skin

SUBCUTIS
lower layer of
the skin



Degrees of burn



First degree | Second degree | Third degree

Degrees of burn

First aid divides burns into three degrees:

First degree:

First degree burns only affect the upper layer of the skin. Reddening of the skin occurs, with slight swelling and burning pain due to the nerve endings being irritated. The skin remains intact and there are no visible scars.

Second degree:

Second degree burns damage the upper layer of the skin and the true skin. Blisters will form and the surface of the skin will be damaged. The injured person will experience severe pain due to the nerve endings being extremely irritated. Redness and swelling are generally also present. Second degree burns can lead to the formation of scars.

Third degree:

Third degree burns damage all of the skin layers. Because the skin's nerve endings are completely destroyed, no pain is to be expected in the central region of the burn. However, the peripheral areas will still be affected by extremely painful first or second degree burns. Third degree burns can be identified by a leathery, dry thickening of the skin. The central region is notable for being severely discoloured (black, white, grey and / or brown).

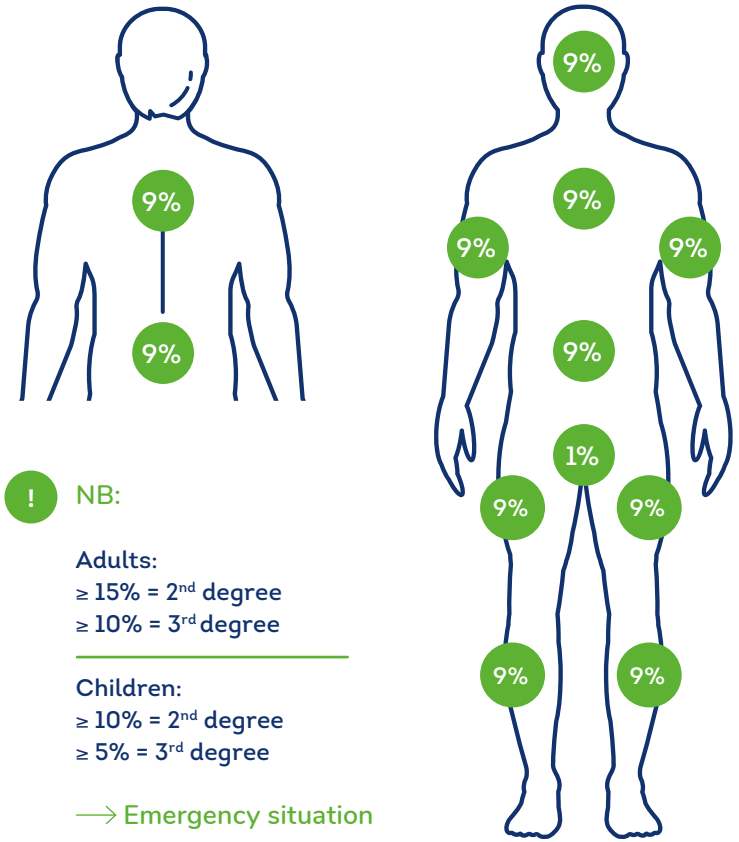
Wallace's Rule of Nine (for adults)

The surface area covered by the burn is also extremely significant as, together with the degree of the burn, it gives an indication of whether or not the injured person is in a critical condition.

The area covered is measured as a percentage (%):

Head:	9%	Back:	18%
Left arm:	9%	Left leg:	18%
Right arm:	9%	Right leg:	18%
Front torso:	18%	Genitalia:	1%

As an alternative to the rule of nine, the 'Hand Rule' can also be used, e.g. for minor burns. The patient's hand, including fingers, corresponds to around 1% of the surface of the body.



! NB:

Adults:
≥ 15% = 2nd degree
≥ 10% = 3rd degree

Children:
≥ 10% = 2nd degree
≥ 5% = 3rd degree

→ Emergency situation

First aid: Minor burns:

- Cool with lukewarm water for 10 minutes, ideally 20 minutes immediately after the accident
- Carefully remove loose clothing that is not stuck to the skin and jewellery in the vicinity of the burn
- Keep the wound as clean as possible and cover with a clean dressing
- Do not use any ointment or similar product

First aid: Extensive burns:

- If items of clothing are on fire: immediately quench the flames using blankets, water or, in an emergency, a fire extinguisher
- Dial the emergency number **112** immediately
- Remove jewellery and items of clothing that are not stuck to the skin
- Cover the wound with a sterile or clean dressing to prevent infection
- Do not expose the burn to airflows
- **Do not cool, as this could cause hypothermia!**
- **Think about heat preservation at all costs!** Cover the person with an emergency blanket

! **Never use a household remedy to alleviate pain or as a treatment!**

Chemical burns:

In the event of chemical burns, it is important to rinse the wound with plenty of water. It is important to use running water to make sure that the chemicals do not cause further damage. Take care when rinsing to ensure that unaffected areas of the skin do not make contact. The product should also be secured so that the right treatment can be subsequently applied in hospital. **Protect yourself!**

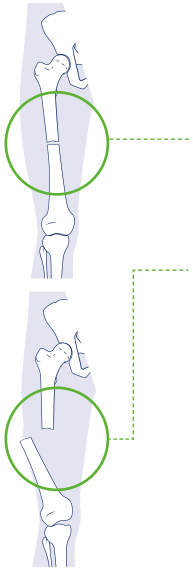
Electrical accidents:

In the event of an electrical accident, it is particularly important to observe **self-protection** measures, as electricity can be life-threatening. It is therefore important to proceed with caution and always notify the emergency services. Electricity can cause minor to serious burns depending on the strength of the electric shock. Resulting symptoms such as cramps and cardiac troubles can also be expected. Electrical accidents with burns generally produce one entry wound and one exit wound. The major part of the burn is therefore not visible but is located inside the body between the entry and exit point. The external wounds should be covered with a sterile or clean dressing.

2.2 BONE AND JOINT INJURIES

2.2.1 Bone fractures

The human skeleton consists of around 206 bones and is the supporting structure of our body. A fracture occurs if a bone breaks. Most bone fractures are the result of a violent external impact (e.g. a blow, fall, shock, etc.)



First aid distinguishes between two types of bone fracture:

Closed bone fractures:
There is no visible wound in the area of the broken bone.

Open bone fractures:
There is a visible wound in the area of the broken bone.

! There is an increased risk of infection in this case!

| Diagnosis:

Definite signs:

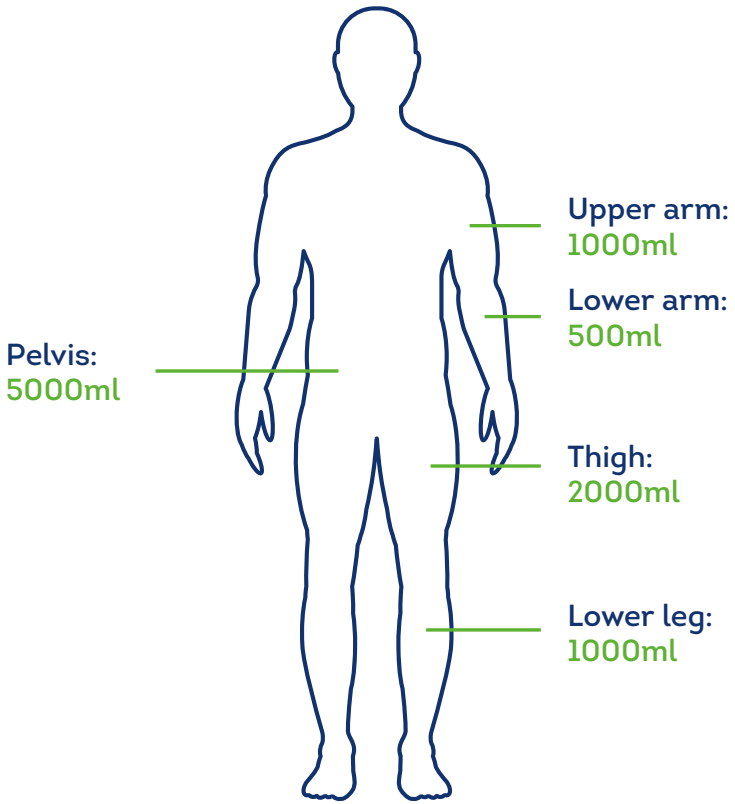
- Axial displacement of the bone
- Crepitation
- Abnormal movement
- Visible bone fragments

Inconclusive signs:

- Pain
- Swelling
- Haematoma
- Limited movement
- Protective posture

△ | **Risk:** Acute fractures can cause damage to blood vessels, muscles, nerves and organs. Damage to blood vessels can lead to life-threatening bleeding. Both internal and external bleeding are possible.

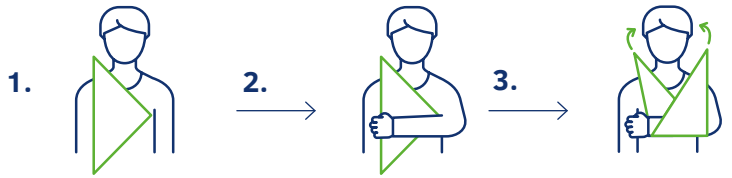
Possible areas of bleeding with closed fractures:



| First aid:

- Avoid moving the fractured area if possible
- Help the affected person by moving them into a comfortable position
- In the event of open broken bones: stop any bleeding and cover with sterile bandages
- Call the emergency number depending on the circumstances
- Clarification must always be sought from a hospital if a fracture is suspected
- Immobilise arm or shoulder injuries using an Esmarch bandage

Immobilising the arm using an Esmarch bandage:



Video showing the immobilisation of an arm

Some specific fractures

Rib fracture:

! | Causes: Violent external impact, blow or fall

| Diagnosis:
- Severe pain when breathing
- Difficulty breathing
- Abnormal movement of the chest
- Blue colouration of the lips

| First aid:
- Position the injured person as they request
- Semi-reclined position
- Call the emergency number if the person has difficulty breathing
- In case of unconsciousness: place in recovery position on the injured side (see p. 78-79)

Pelvic fracture:

! | Causes: Traffic accidents, falling from a great height, shock, etc.

| Diagnosis
- Extremely severe pain
- Abnormal movement of the iliac wing
- External rotation of one or both legs

| Risk: The greatest risk in the event of a pelvic fracture is **the risk of shock** due to severe internal bleeding in the pelvic region caused by an injury to a large blood vessel. Approximately 5 litres of blood circulate in the pelvic region.

| First aid:
- Avoid moving the injured person if possible
- Respect the wishes of the affected person
- Call the emergency number
- Keep the person warm (e.g. cover with an emergency blanket)

Traumatic brain injury (minor to severe head injury):

! | Causes: Violent external impact, blow, shock, fall, etc.

| Diagnosis:

- Temporary loss of consciousness
- Headache
- Nausea, vomiting
- Disorientation
- Dizziness
- Brief or extended memory loss, memory lapses
- Unconsciousness
- Possibly unequal pupils
- Paralysis
- Double vision
- Irregular breathing
- Bleeding from the ears or nose
- Possible discharge of brain mass

△ | Risk: Neurological damage is to be expected as a result of serious traumatic brain injury.

| First aid:

- Cover head wounds with a clean dressing
- Keep the airways clear in the event of midface injuries
- Keep the upper body elevated but move the person to a supine position if spinal injuries are suspected!
- In case of unconsciousness: place in recovery position (on the injured side in case of bleeding from the ear) (see p. 78-79)
- Call an emergency number

Spinal injury:

! | Causes: Traffic accidents, falling from a great height, shock, etc.

| Diagnosis:

- Severe pain
- Sensory disturbances
- Paralysis
- Respiratory depression (affected person is no longer breathing sufficiently)

△ | Risk: A cervical spine injury can lead to respiratory disorders, a high risk of paraplegia and in the worst cases, immediate death.

| First aid:

- Do not move the person if they are in a critical condition
- In case of unconsciousness: place in recovery position (see p. 78-79)
- Stabilise the head with both hands
- Calm the person
- Call an emergency number

2.2.2 Joint injuries

Joints are the moving parts between several bones. They are held together by ligaments to enable the bones to remain in their correct position. Joints can be moved by muscular pull/work.

The most common types of joint injury are distortions and dislocations.

Distortion:

! | Causes: In the event of distortion, the bone ends in the region of a joint are briefly displaced, but then immediately spring back into the correct position. This is often the case with a twisted ankle.

| Diagnosis:

- Swelling
- Haematoma
- Limited movement
- Severe pain

| First aid: **One of the basic measures is the 'Rice Rule'. This rule describes the procedure to follow in the event of a distortion:**

R Rest
(do not move)

↓

I Ice
(cool down)

↓

C Compression
(bind, bandage)

↓

E Elevation
(raise the limb if possible)

Luxation:

! | Causes: In the event of luxation, the bones jerk out of their joint, generally due to a blow or violent impact, and remain in this defective position.

| Diagnosis:

- Defective position
- Swelling
- Severe pain
- Complete loss of use
- Haematoma

| First aid:

- Immobilise the injured joint
- Respect the wishes of the affected person when arranging them into a protected position
- Cool down
- Raise the limb if possible

No attempts should be made to reposition the joint, as this is a job for the medical team.

2.3 BREATHING AND HEART PROBLEMS

2.3.1 Breathing problem: Foreign body aspiration

The airways conduct respiratory air through the mouth and nose into the lungs and back again. A foreign body can block the airways so that air can no longer enter the lungs, leading to the threat of suffocation. First aid must be administered immediately in this kind of situation.

! | Causes: This type of incident generally occurs in adults as a result of inattention whilst eating. In children, however, it is generally caused by swallowing items when playing.

| Diagnosis:

- Sudden onset of coughing
- Respiratory sounds
- Difficulty breathing
- Panic, frantic gesticulation, gripping of the neck
- Bright red face
- Bluish tint to the skin

In order to offer the appropriate kind of help, it is important to decide immediately whether the cough is effective or ineffective:

Ineffective cough:

- Unable to speak
- Silent or quiet cough
- Unable to breathe, bluish tint to the face
- Deteriorating state of consciousness

Effective cough:

- Crying or verbal reaction when spoken to
- Loud cough
- Able to inhale before coughing
- Conscious

Video showing the foreign body algorithm for adults

First aid:

Initial assessment

Ineffective cough

Effective cough

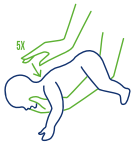
Encourage coughing:
Continuous observation of the clinical situation

when conscious:

in case of unconsciousness:
Apply resuscitation procedures
(see p. 58-59)

< 1 year

5x
slaps on the back



5x
jerky chest compressions

repeat until the airways are free or unconsciousness occurs

> 1 year

5x
slaps on the back

5x
Heimlich manoeuvres

repeat until the airways are free or unconsciousness occurs

Video showing the foreign body algorithm for babies

! To be monitored in hospital

- Call the emergency number as soon as possible if two helpers are present!
- If one helper is present, call for help, complete one cycle of slaps on the back/ upper abdomen compressions and then call the emergency number (at the same time)!
- Consider calling the emergency number in the event of an effective cough.

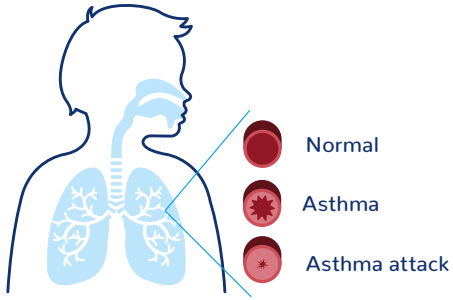
Upper abdomen compressions / Heimlich manoeuvres

These practices can be a way of freeing the airways again. The application of upward pressure in the pit of the stomach creates excess pressure in the lungs. This excess pressure can expel foreign bodies from the airways. The disadvantage of this technique is the risk of internal injuries.

! **It is important to always consult a doctor after the Heimlich manoeuvre has been applied!**

2.3.2 Breathing problem: Asthma

Asthma is a chronic disease of the airways, or more precisely the bronchial tubes. The bronchial tubes of the affected person react to certain stimuli in a hypersensitive manner and narrow spasmodically. In addition, the mucous membranes swell and increasing quantities of mucous are produced. This narrowing of the swollen mucous membranes causes breathing difficulties in the event of an attack.



! | Causes: Asthma can be classified as allergic and non-allergic asthma. Allergic asthma is triggered by allergies (e.g. pollen, animal hair, dust). Non-allergic asthma can be triggered by different factors.

| Diagnosis:

- Extended / strained exhalation
- Difficulty breathing
- Whistling respiratory sound
- Blue-grey, cold sweaty skin
- Bulging veins in the neck
- Upright upper body position (this is known as Coachman's Position when sitting and Goalkeeper's Position when standing)
- Restlessness, anxiety and panic

| First aid:

- Calm the person
- Loosen or open tight clothing
- Keep the upper body elevated
- Help to administer medicines if necessary
- Use 'Pursed Lip Breathing'
- Call the emergency number

'Pursed Lip Breathing' is a breathing technique used for diseases of the bronchial system. The aim is to exhale through loosely closed lips. The increased resistance when exhaling increases the air pressure in the bronchial tubes. This prevents the bronchial tubes from collapsing.

2.3.3 Breathing problem: Hyperventilation

Hyperventilation is deep, accelerated breathing which results in the exhalation of excess carbon dioxide (CO_2). It is important to point out that this does not create a lack of oxygen in the blood. Persistent muscle cramps or paraesthesia gradually occur due to the reduced level of CO_2 in the blood.

! | Causes: Hyperventilation is generally due to psychological factors. Main factors include stress, nervousness, pain, excitement and overexertion. A panic attack is often a trigger.

| Diagnosis:

- Nervousness, restlessness, anxiety
- Tingling sensation in the fingers and around the mouth
- Paw-like hand position, cramping around the mouth
- Dizziness, headache
- Feeling of pressure in the chest, difficulty breathing, feeling of suffocation
- Possible blackout

| First aid:

- Create a peaceful environment
- Calm the person
- Encourage the person to breathe more slowly
- Attempt re-breathing with a plastic bag: The person should exhale into a bag and inhale their own exhaled air again. This helps the body to absorb the missing CO_2 more quickly, allowing breathing difficulties and other symptoms to subside.
- Call the emergency number if the person cannot be calmed

2.3.4 Breathing problem: Chest trauma (ribcage injury)

Ribcage injuries can be caused as a result of a violent external impact. These can include broken ribs and internal organ injuries. Blood or air entering the ribcage can be lifethreatening.

! | Causes:

A distinction is made between blunt injuries (e.g. a shock, fall or blow) and perforating injuries (e.g. stab, gunshot or impalement injuries) when describing chest trauma.

| Diagnosis:

- Breathing difficulties associated with pain
- Rapid, shallow breathing
- Bruises or wounds to the ribcage
- Pain when touching the thorax
- Possible unstable thorax
- Possibly coughing blood

| Erste Hilfe:

- Calm the person
- The upper body should be raised
- Cover open wounds loosely with a clean dressing
- Keep the person warm (e.g. cover with an emergency blanket)
- In case of unconsciousness: place in recovery position on the injured side (see p. 78-79)
- Call the emergency number if necessary

2.3.5 Heart problem: Heart attack

A person needs a healthy heart so that the body can be supplied with sufficient oxygen and nutrients, etc. The heart pumps blood throughout the whole body. The heart muscle needs sufficient energy to work properly. The heart muscle contains blood vessels that supply it with oxygen so that it can work properly. These vessels are known as coronary vessels.

A coronary vessel closes during a heart attack. In this case, the area supplied by the vessel is no longer supplied with blood and oxygen. This causes the muscle to die slowly. Depending on the size of the affected area, the heart muscle may no longer be able to apply enough force to pump blood through the body. This causes a cardiac arrest.

! | Causes: Heart attacks are caused by deposits or blockages in the coronary vessels.

| Diagnosis:

- Severe pain behind the breastbone
- Feeling of tightness in the chest
- Pain radiating through the jaw, left arm, back and upper abdomen
- Fear of death and destruction, restlessness
- Pale, cold sweaty skin
- Irregular pulse
- Nausea, vomiting

| First aid:

- Keep the upper body elevated
- Offer comfort
- **Avoid any further exertion!**
- Help to administer medicines if necessary

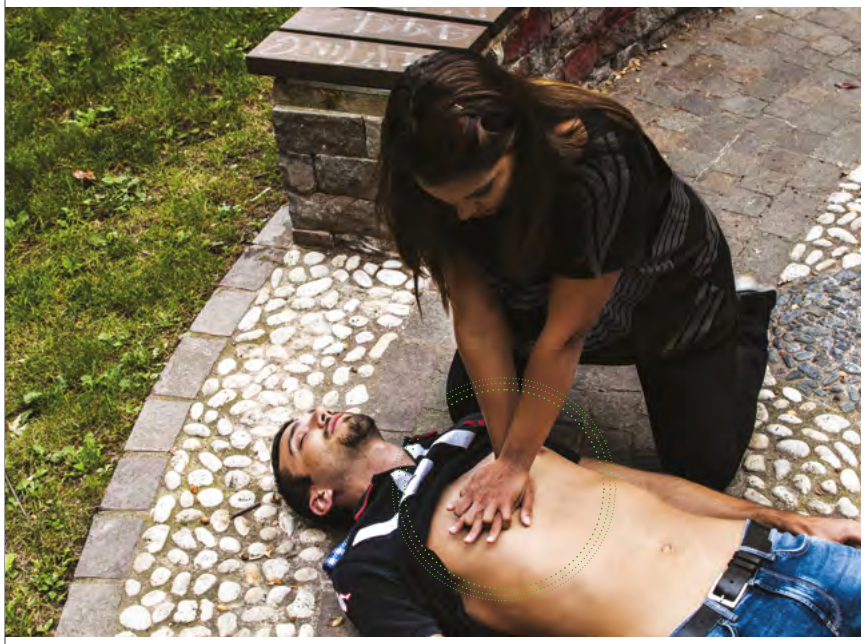
! Always call the emergency number!

2.4 CARDIOPULMONARY RESUSCITATION AND EARLY DEFIBRILLATION

2.4.1 Cardiopulmonary resuscitation

Many people suffer a cardiac arrest every day. People can only survive in this situation if resuscitation begins immediately. The entire body is very quickly affected by a lack of oxygen. This lack of oxygen can lead to serious damage, particularly to the brain. The initial damage occurs after only a few minutes without cardiopulmonary resuscitation. The person's chances of survival are reduced with every minute lost.

- The aim of resuscitation is to protect the person from damage caused by a lack of oxygen by enabling the heart to resume the pumping of blood through the body, by means of manual chest compressions. This gives the person a good chance of survival without serious consequential damage.



What constitutes Basic-Life-Support (BLS)?

- Calling for help + calling the emergency number
- Recognising circulatory arrest
- Freeing the airways and keeping them clear
- Applying manual chest compressions without aids **(100 - max. 120/minutes and 5-6cm deep)**
- Artificial respiration with or without simple aids

Video showing resuscitation without AED

In order to identify circulatory arrest, consciousness and breathing must be controlled:

1.

Talk to the person and shake them gently:
are they responding?

2.

Lift the head and raise the chin

3.

Check breathing for 10 seconds:

- Can breathing be **heard**?
- Can chest movements be **seen**?
- Can breath be **felt** on the cheek?

4.

If the person is not responding and not breathing, the emergency number must be called. It is important to emphasise that this does not constitute resuscitation. Action must be taken immediately. There is no time to lose. Ideally you should call for extra assistance. Continue with resuscitation until the emergency services arrive or the person starts breathing independently again and the heart can beat without assistance.

INFO: Telephone resuscitation/control centre-led resuscitation

Telephone resuscitation consists of standardised resuscitation instructions during the emergency call. The person from the control centre will stay on the line at your request and will provide step-by-step instructions for cardiopulmonary resuscitation until the emergency services arrive.

1.

Check to see whether the person is responding »

- Shake them gently by the shoulders
- Talk to the person in a loud voice

No response »

- Free up the airways
- Check breathing for **10 seconds**

2.

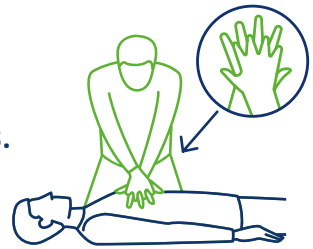
No response or No normal breathing »

- Call the emergency number
- Obtain an AED

Normal breathing

- Place the patient in the recovery position (see p. 78-79)
- Call the emergency number
- Constantly check breathing

3.



Start chest compressions immediately »

- Place the heels of the hands in the centre of the chest
- Carry out 30 chest compressions:
  - Press the breastbone down by at least 5 cm but no more than 6 cm
  - Repeat at a rate of 100 - max. 120 / minute
- If you are experienced and in a position to offer artificial respiration:
  - Combine chest compressions with artificial respiration (at a rate of 30:2); otherwise, simply apply cardiac massage
  - To perform artificial respiration, place your lips around the person's mouth whilst pinching their nostrils
  - Breath out twice
- Continue with cardiopulmonary resuscitation at a rate of 30:2

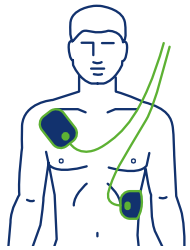
4.

if an AED is available: »

- Strip to the waist (including bra) and towel dry if necessary
- Shave chest hair if necessary
- Switch on and apply electrodes

- Follow the verbal and on-screen instructions
- Place one electrode to the left of the centre of the chest
- Place the other defibrillation electrode underneath the right collarbone next to the breastbone
- If more than one helper is present: if possible, do not interrupt cardiopulmonary resuscitation when applying the electrodes

5.



Follow the AED instructions if a shock is recommended »

- Do not move the person, apply the shock
- Resume cardiopulmonary resuscitation immediately

If the person shows no obvious signs of life, continue with cardiopulmonary resuscitation until the emergency services arrive.

Specific procedures for the resuscitation of children and babies

- **5 initial rounds** of artificial respiration after circulatory arrest has been identified
- Frequency of chest compressions: 100 - max.120 / min.
- Depth of pressure: 1 / 3 of breastbone
- Ratio of chest compressions to artificial respiration: 30:2
- Adapt artificial respiration volume to the age and size of the child

For children:
Perform chest compressions with the heel of one hand (or two hands depending on the size of the child) and lift the head according to the size of the child

For babies:
Perform chest compressions with two fingers on the centre of the chest and place the head in the sniffing position

Video showing the resuscitation of babies

2.4.2 Automatic External Defibrillation (AED)

An automated external defibrillator (AED) is a medical device which is used to treat cardiac arrhythmia. The device analyses the rhythm of the heart independently so that it can apply a current pulse if necessary. The AED can be used by inexperienced helpers.

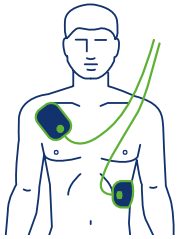
INFO:

- **Defibrillated rhythms:**
  Ventricular fibrillation, pulseless ventricular tachycardia
- **Non-defibrillated rhythms:**
  Asystole, pulseless electrical activity

The heart muscle is stimulated by its own electrical signals. In the event of cardiac arrhythmia, these signals are no longer transmitted, which leads to the formation of disordered signals in the affected area. The contraction of the heart is no longer sufficient to pump blood around the body, so the circulation breaks down. An electric shock combined with chest compressions and possible artificial respiration are necessary to treat the condition.

In the majority of cases in which cardiac arrest occurs, the heart rhythm requires an electric shock. The person has a higher chance of survival if the first aider uses a defibrillator in addition to immediate basic resuscitation.

Procedure for using AED:



Video showing resuscitation with AED

- Strip to the waist (including bra) and towel dry if necessary
- Shave chest hair if necessary so that the electrodes can grip the skin more effectively
- Switch on the AED
- Apply electrodes during the cardiac massage
- Cardiopulmonary resuscitation algorithm the ratio of 30:2 still applies
- Follow the device's instructions
- Administer shocks if required by the AED
- Do not move the affected person during analysis and shock phase!
- Immediately return to the cardiopulmonary resuscitation algorithm in case of complications

ARRÊT CARDIAQUE réagis!

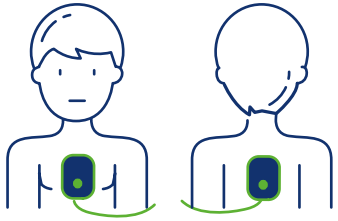
An AED will only be used if at least two people are present or the device is in the immediate vicinity!

DO NOT DEFIBRILLATE:

- In water or in wet conditions
- On an electrically conductive surface
- In environments at risk of explosion or fire
- With children under the age of 1

Defibrillation in children:

An AED is only used with children over the age of one. Paediatric electrodes may be used depending on the size of the child. If no paediatric electrodes are available, adult electrodes may also be used. However, they must not touch. If the upper body is too small, one electrode should be placed on the breastbone and the other between the shoulder blades.



2.5 IMPAIRED CONSCIOUSNESS

2.5.1 Diabetes mellitus

Diabetes mellitus is a chronic metabolic disorder which causes disruptions in the body's blood sugar levels.

Insulin is a hormone produced in the pancreas. It lowers the blood sugar level and indirectly influences other metabolic reactions. It is released as soon as the blood sugar level exceeds a certain value in order to transport sugar (glucose) to the body's cells, where it acts as a supplier of energy.

There are 2 main types of diabetes mellitus

Type 1 diabetes:

This is an autoimmune disease in which the insulin-producing cells of the pancreas are destroyed. This leads to total insulin deficiency, which is why the affected person has to administer their own insulin injections. The disease generally occurs in childhood and adolescence.

Type 2 diabetes:

This is caused by the malfunctioning of insulin in the body's cells (insulin resistance). The hormone is produced, but its effect on the cells is ineffective, which means that insufficient sugar is transferred from the blood to the tissues. A number of risk factors (e.g. excess weight or inactivity) can contribute to the development of the disease. Type 2 diabetes generally occurs from middle age, but younger people may also be affected.

Other types of diabetes:

Gestational diabetes and other forms

Possible acute complications

Hypoglycaemia

Hyperglycaemia

Hypoglycaemia:

! | Causes: Hypoglycaemia occurs in a diabetic person due to, among other things, an insulin overdose, strong physical exertion, insufficient sugar intake, stress, etc.

▷| Folge: Hypoglycaemia deprives the brain cells of 'fuel', as the main supplier of energy to the brain is glucose. As a result, the brain is the first to be affected when the blood sugar level drops.

| Diagnosis:

- Pale and light-headed
- Ravenous appetite
- Shivery
- Irritable
- Tired / sleepy
- Restless
- Poor concentration
- Double vision, seeing stars
- Possible unconsciousness
- Possible seizure

! **Rapid onset!**

| First aid:

- Position the person as they request
- In case of unconsciousness: place in recovery position (see p. 78-79)
- Offer quick-release sugar
- Prevent harm (in case of restlessness or seizure)
- Monitor breathing
- Call the emergency number as soon as possible
- Keep the person warm (e.g. cover with an emergency blanket)

Hypoglycaemia:

Irritability

Tiredness

Headache

Pallor

Sweating

Hunger

Visual disturbances

Shivering

Dizziness

Hyperglycaemia:

! | Causes: Hyperglycaemia in a diabetic person is often caused by insufficient insulin and an increased sugar intake.

| Diagnosis:

- Excessive urination
- Tiredness
- Dry mucous membranes and skin
- Fast pulse
- Generally deep breathing
- Possible smell of acetone on the breath
- Sleepiness or even unconsciousness

! **Develops over hours or days!**

| First aid:

- Position the person as they request
- In case of sleepiness or unconsciousness: place in recovery position (see p. 78-79) + call the emergency number
- Monitor breathing
- Keep the person warm (e.g. cover with an emergency blanket)

Hyperglycaemia:

Tiredness

Sleepiness

Increased urination

Thirst

Dry tongue

2.5.2 Epilepsy

Epilepsy leads to a malfunctioning of the nervous system. The main form of epilepsy is characterised by sudden seizures. During these seizures, the neurons in the brain start to discharge in an abrupt, synchronous and excessive manner. Uncoordinated signals are transmitted to the muscles. This uncoordinated discharge can be triggered by external stimuli such as flickering light or certain smells.

Seizures are different for each individual concerned. A distinction is made between:

Focal or partial epileptic seizures:

Focal or partial epileptic seizures only affect a specific area of the brain with the corresponding symptoms. They are often only visible due to twitching in a certain part of the body.

Generalised seizures (Grand Mal seizures):

Generalised seizures always affect both sides of the brain and are characterised by muscle spasms/muscle twitching. Uncontrolled twitching and spasms are visible in all muscles.

Absences (Petit Mal seizures):

An absence is the most common form of seizure in children. An absence is characterised by a brief disturbance of consciousness. The affected person is not responsive during this brief period. Twitching and spasms do not occur in this case. Absences can occur several times a day.

Seizure:

| Diagnosis:

- Initial cry followed by loss of consciousness
- Muscle spasms
- Possible partial spasms
- Blue colouring to the lips/face
- Biting the tongue
- Possible foaming at the mouth
- Enuresis
- Post-seizure sleep

Seizures which last for more than five minutes or several seizures in succession can be life-threatening!

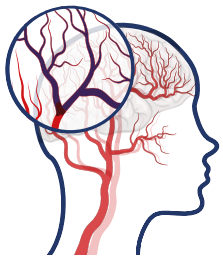
| First aid:

- Protect the person from injury
- In case of unconsciousness or post-seizure sleep: place in recovery position (see p. 78-79)
- Monitor breathing
- Call the emergency number
- Keep the person warm (e.g. cover with an emergency blanket)
- **Do not place a wedge** between the teeth (risk of injury)!

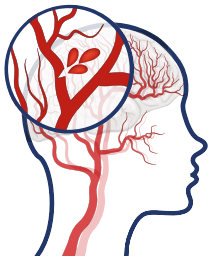
2.5.3 Stroke

A stroke is caused by a sudden circulatory disturbance in the brain. Rapid medical attention must be sought in the event of a stroke! There is a risk that the brain cells could die, with the patient suffering lasting damage such as paralysis or speak disturbances. Indications of a stroke can be identified early on using the FAST procedure. The main causes of a stroke are a cerebral infarction and a cerebral haemorrhage, but the first aider will not be able to distinguish between the two.

Risk factors for a stroke include, among other things, high blood pressure, diabetes, smoking, stress, excess weight and elevated blood lipids.



Cerebral infarction



Cerebral haemorrhage

| Diagnosis:

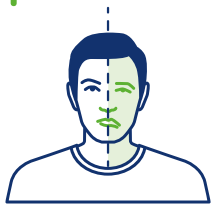
- Possible headache and / or nausea
- Speaking and language disturbances
- Drooping corner of the mouth (asymmetric facial expression)
- Paralysis on one side, numbness
- Visual disturbances
- Disturbance or loss of consciousness
- Possibly unequal pupils

| First aid:

- Rapid identification, use the FAST procedure, no time to lose
- Call the emergency number as soon as possible
- Position the person as they request
- Raise the upper body
- Monitor breathing
- Keep the person warm
- In case of unconsciousness: place in recovery position (see p. 78-79)

Fast procedure

F



FACE

Smile:

Ask the affected person to smile.

Is a grimace or asymmetric facial expression observed? Or a drooping corner of the mouth?

A

ARMS

Raise the arms:

Ask the affected person to raise both arms with the palms facing upwards.

Is one side weaker than the other?

S

SPEECH

Repeat a sentence:

Ask the person to repeat a sentence.

Is their speech slower than normal or unclear?

T

TIME

If any of these signs are observed:

Do not waste any time and act as quickly as possible!

When did the first symptoms occur?

2.5.4 Unconsciousness

When a person is unconscious, vital functions are disrupted, which presents a number of risks:

- Absence of adverse-effects reflex
- Aspiration (breathing in foreign bodies or liquids such as blood/vomit)
- Obstruction of the airways due to the tongue slipping to the back of the mouth

! **Therefore, the first aider must always place the unconscious person in the recovery position.**

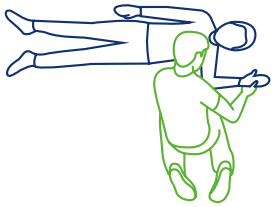
Video showing the recovery position

The recovery position:

Consciousness and breathing must be checked first of all! It must then be determined whether the person is unconscious or requires resuscitation.

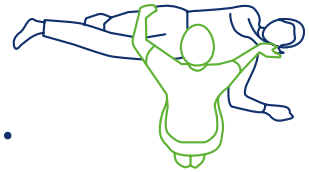
Check breathing
The person is breathing:
→ **Recovery position**
The person is not breathing:
→ **Resuscitation (see p. 58-59)**

2.



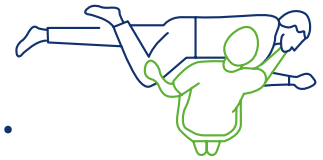
Straighten out both of the person's legs. Then position the arm facing you upwards at a right angle.

3.



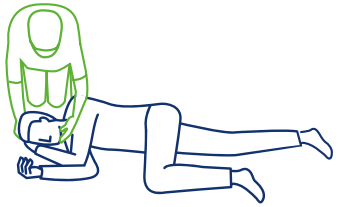
Position the other arm across the chest with the back of the hand on the patient's cheek. Hold this hand firmly with your hand.

4.



Now raise the leg lying opposite you, hold firmly and turn the person towards you.

5.



Lift the head so that the airways are free and any vomit or blood can flow away. It is important to monitor breathing continuously so that respiratory arrest can be identified more quickly. Protect the person against heat loss (emergency blanket, jacket, etc.).

2.5.5 Helmet removal

Motorcycle helmets are only removed by first aiders if the motorcyclist is unconscious or requires resuscitation, as an effective recovery position or cardiopulmonary resuscitation are otherwise impossible. If possible, the helmet should be removed by two first aiders.

1. **First aider 1** stabilises the head from above by holding the helmet and patient's lower jaw firmly.

2. **First aider 2** opens the visor (removes glasses if present).

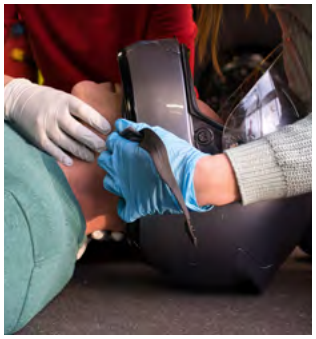
3. **First aider 2** unfastens the chin strap.

4. **First aider 2** now takes hold of the head. They should stabilise the head with one hand just above the nape of the neck and hold the patient's lower jaw firmly with the other hand.

Helmet removal video

5. **First aider 1** now pulls the helmet straight back.

   First aider 2 moves the hand positioned behind the head upwards at the same time whilst the helmet is being removed. They should continue to stabilise the lower jaw with the other hand.



6. After the helmet has been removed, **First aider 1** takes hold of the head again.

   First aider 2 can now let go of the head.

7. The patient is then moved into the recovery position by both first aiders. Whilst the patient is being turned, **First aider 1** continues to hold the head so that the patient remains in axial alignment.

8. Breathing must be closely monitored so that resuscitation can begin immediately in the event of respiratory arrest. (Tilt the head back and make sure the airways are clear and open.)

BIBLIOGRAPHY

Dirks B. (2021):

Reanimation 2021. Leitlinien kompakt.

German Resuscitation council-Deutscher Rat
für Wiederbelebung, Ulm.

Horper N., Oth-Gallion C., Weicherding P., Bauler F. (2012):

Erste Hilfe.

Administration for Emergency Services that have the approval of
the Minister of Health and the Minister of the Interior
Imprimerie Centrale s.a., Luxembourg.

Wischerhoff J. (2020):

*Der Erste-Hilfe-Ausbilder. Praxisbuch zu pädagogischen
und medizinischen Grundlagen*

(3. Aufl.). Stumpf + Kossendey Verlag, Edewecht.

h2a.lu